U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-271 474

Lake Texoma, Cooke and Grayson Counties, Texas; Bryan, Johnson, Love, and Marshall Counties, Oklahoma

National Eutrophication Survey, Corvallis, Oreg

Prepared for

Corvallis Environmental Research Lab, Oreg

Mar 77

PB 271 474

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES

CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON
and
ENVIRONMENTAL MONITORING & SUPPORT LABORATORY - LAS VEGAS, NEVADA

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

GPO 699-440

REPORT
ON
LAKE TEXOMA
COOKE AND GRAYSON COUNTIES, TEXAS;
BRYAN, JOHNSON, LOVE, AND
MARSHALL COUNTIES, OKLAHOMA
EPA REGION VI
WORKING PAPER NO. 663

WITH THE COOPERATION OF THE
TEXAS WATER QUALITY BOARD,
THE OKLAHOMA DEPARTMENT OF WATER POLLUTION CONTROL,
THE TEXAS NATIONAL GUARD, AND THE OKLAHOMA NATIONAL GUARD
MARCH, 1977

TECHNICAL REPORT DATA

[illegible]

1. REPORT NO.

2.

3. RECIPIENT'S ACCESSION NO. PB-271 474

4. TITLE AND SUBTITLE
Report on Lake Texoma, Cooke and Grayson Counties,
Texas and Bryan, Johnson, Love and Marshall Counties,
Oklahoma

5. REPORT DATE
Prepared March 1977

6. PERFORMING ORGANIZATION CODE

7. AUTHOR(S)
Ancnymous (National Eutrophication Survey Staff)

8. PERFORMING ORGANIZATION REPORT NO.
Working Paper # 663

9. PERFORMING ORGANIZATION NAME AND ADDRESS
National Eutrophication Survey
U.S. Environmental Protection Agency
200 S. W. 35th St.
Corvallis, Oregon 97330

10. PROGRAM ELEMENT NO.

11. CONTRACT/GRANT NO.

12. SPONSORING AGENCY NAME AND ADDRESS
Office of Research and Development
U.S. Environmental Protection Agency
401 M Street, S. W.
Washington, DC 20460

13. TYPE OF REPORT AND PERIOD COVERED
Final -1974

14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES
Prepared in cooperation with the U.S. Environmental Protection Agency, National Environmental Research Center, Las Vegas, Nevada 89114

16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
eutrophication		
lakes		08H
nutrients		06C
phosphorus		
nitrogen		
loading		

18. DISTRIBUTION STATEMENT Release unlimited	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES 68
	20. SECURITY CLASS *(This page)*	22. PRICE PC A04 MF A01

EPA Form 2220-1 (9-73)

CONTENTS

	Page
Forward	ii
List of Texas Study Reservoirs	iv
Lake and Drainage Area Map	vi

Sections

I.	Conclusions	1
II.	Lake and Drainage Basin Characteristics	4
III.	Lake Water Quality Summary	6
IV.	Nutrient Loadings	11
V.	Literature Reviewed	17
VI.	Appendices	18

FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGEMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U.S. Environmental Protection Agency) expresses sincere appreciation to the Texas Water Quality Board and the Oklahoma Department of Pollution Control for professional involvement, to the Texas National Guard and the Oklahoma National Guard for conducting the tributary sampling phase of the Survey, and to those Texas and Oklahoma wastewater treatment plant operators who voluntarily provided effluent samples.

Hugh C. Yantis, Jr., Executive Director of the Texas Water Quality Board, and John B. Latchford, Jr., Director, and the staff of the Field Operations Division provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary report with respect to the Texas portion of the drainage, and provided critiques most useful in the preparation of this Working Paper.

Dr. Denver Talley, Director, Oklahoma Department of Pollution Control; the staff of the Oklahoma Water Resources Board; and the staff of the Oklahoma State Department of Health provided information on the Oklahoma point sources and tributaries and reviewed the preliminary report with respect to the Oklahoma portion of the drainage.

Major General Thomas Bishop, the Adjutant General of Texas, and Project Officer Colonel William L. Seals, who directed the volunteer efforts of the Texas National Guardsmen; and Major General John Coffey, Jr., the Adjutant General of Oklahoma, and Project Officers Colonel Curtis W. Milligan and Major James O. Haney, Jr., who directed the volunteer efforts of the Oklahoma National Guardsmen; are also gratefully acknowledged for their assistance to the Survey.

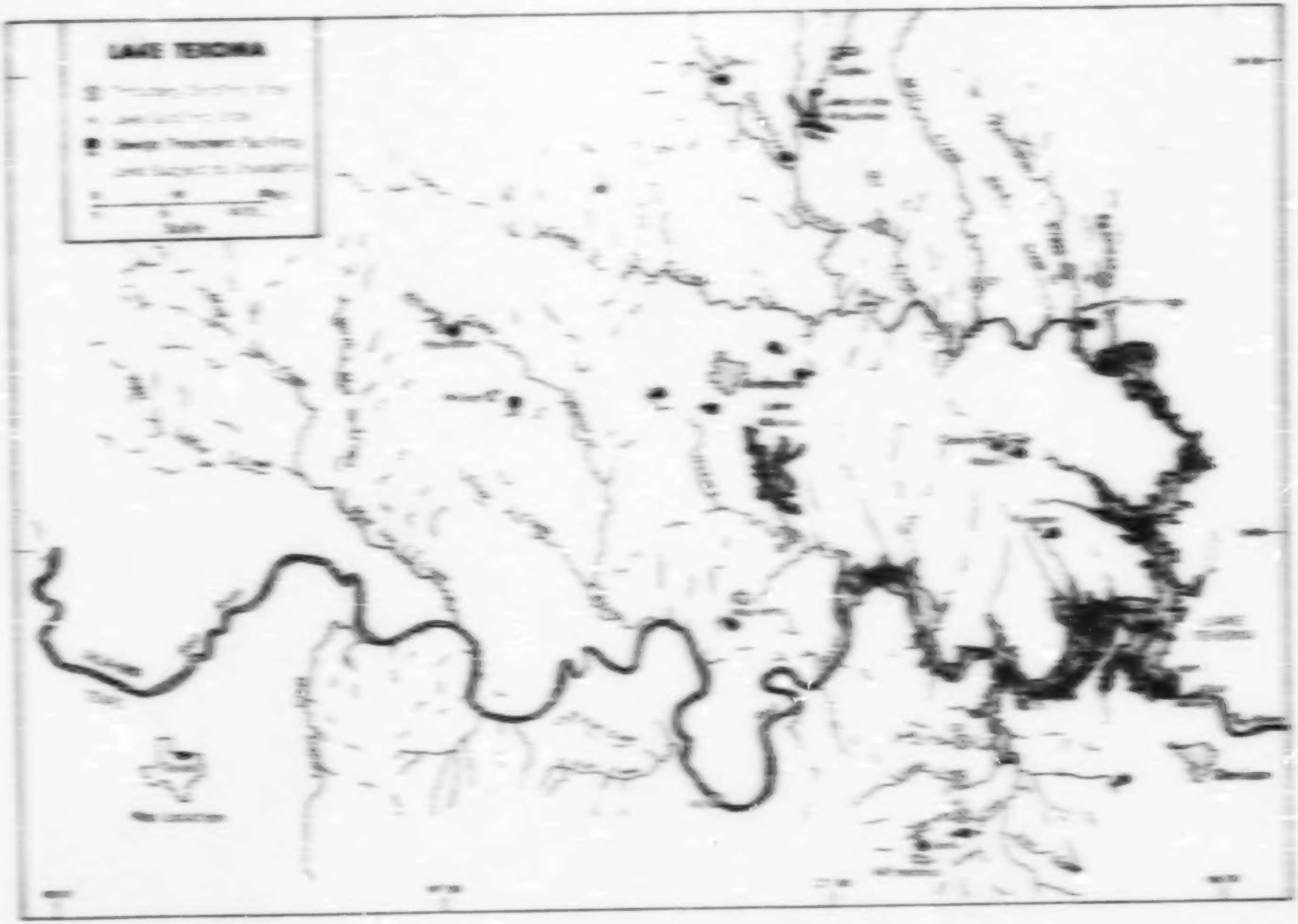
NATIONAL EUTROPHICATION SURVEY

STUDY RESERVOIRS

State of Texas

NAME	COUNTY
Amistad	Val Verde
Bastrop	Bastrop
Belton	Bell, Coryell
Braunig	Bexar
Brownwood	Brown
Buchanan	Burnet, Llano
Caddo	Harrison, Marion, TX; Caddo Parish, LA
Calaveras	Bexar
Canyon	Comal
Colorado City	Mitchell
Corpus Christi	Jim Wells, Live Oak, San Patricio
Diversion	Archer, Baylor
Eagle Mountain	Tarrant, Wise
Fort Phantom Hill	Jones
Houston	Harris
Kemp	Baylor
Lake O'The Pines	Camp, Marion, Morris, Upshur
Lavon	Collin
Lewisville (Garza-Little Elm)	Denton
Livingston	Polk, San Jacinto, Trinity, Walker

Lyndon B. Johnson	Burnet, Llano
Medina	Bandera, Medina
Meredith	Hutchinson, Moore, Potter
O. C. Fisher (San Angelo)	Tom Green
Palestine	Anderson, Cherokee, Henderson, Smith
Possum Kingdom	Palo Pinto, Stephens, Young
Sam Rayburn	Angelina, Jasper Nacogdoches, Sabine, San Augustine
Somerville	Burleson, Lee, Washington
E. V. Spence	Coke
Stamford	Haskell
Stillhouse Hollow	Bell
Tawakoni	Hunt, Rains, Van Zandt
Texoma	Cooke, Grayson TX; Bryan, Johnston, Love, Marshall, OK
Travis	Burnet, Travis
Trinidad	Henderson
Twin Buttes	Tom Green
White River	Crosby
Whitney	Bosque, Hill
Wright Patman (Texarkana)	Bowie, Cass


LAKE TEXOMA
Sewage Treatment Facility
Scale
Map Location

LAKE TEXOMA

STORET NO. 4834

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Lake Texoma is eutrophic; i.e., well supplied with nutrients and quite productive. Whether nutrient enrichment is beneficial or deleterious depends on the actual or potential effect on the uses of the lake. In this regard, no nuisance conditions are known to personnel of the Texas Water Quality Board and there is little or no impairment of the designated beneficial uses of this water body.

Lake Texoma ranked thirtieth in overall trophic quality when the 39 Texas reservoirs sampled in 1974 were compared using a combination of six water quality parameters*. Twenty-two of the reservoirs had less and two had the same median total phosphorus, 28 had less and two had the same median dissolved orthophosphorus, 24 had less and one had the same median inorganic nitrogen, 21 had less mean chlorophyll *a*, and 15 had greater mean Secchi disc transparency. Marked depression or depletion of dissolved oxygen with depth occurred at stations 1, 2, 3, and 5 in August.

Survey limnologists noted emergent vegetation at stations 5 and 6 in March; however, it is reported that macrophytes are not a problem (Moczygemba, 1974).

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* See Appendix A.

B. Rate-Limiting Nutrient:

Due to significant nutrient losses in the samples during shipment from the field, the algal assay results are not representative of conditions in the lake at the time the samples were taken (03/09/74 and 10/31/74). The lake data indicate nitrogen limitation at all sampling stations and times, with the exception of station 2 in March and October.

C. Nutrient Controllability:

1. Point sources--During the sampling year, the listed point sources contributed only 2.6% of the total phosphorus load to Lake Texoma.

The present phosphorus loading of 4.10 g/m^2/year is six times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading (see page 16). Phosphorus control at the listed point sources probably would not result in a significant improvement in the trophic condition of Lake Texoma. However, there are additional point sources which contribute phosphorus to the Red River and Washita River drainage basins further upstream, and it is possible that a significant portion of the phosphorus loads from these sources impacts the lake (see discussion below).

2. Non-point sources--Non-point sources contributed 97.7% of the total phosphorus input to Lake Texoma during the sampling year. The Red River contributed 69.7%, the Washita River contributed 26.3%, and four other gaged tributaries collectively contributed 0.7%. Ungaged tributaries and immediate drainage were estimated to have contributed 1.3%.

The phosphorus export rates of the Red River, the Washita River, and Hickory Creek were greater than the rates of the other gaged tributaries (see page 15). This may be indicative of additional point sources which are significant contributors to the Lake Texoma load, an underestimation of the listed point source loads, or particular land-use practices in the drainage. Further study is needed to determine the controllability of all phosphorus inputs to this lake.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS[†]

A. Morphometry[††]:

1. Surface area: 360.18 kilometers^2.
2. Mean depth: 5.7 meters.
3. Maximum depth: 28.7 meters.
4. Volume: 2,053.026 x 10^6 m^3.
5. Mean hydraulic retention time: 173 days (based on outflow).

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Red River	14,351.1	80.980
Hickory Creek	318.6	1.550
Washita River	18,907.0	45.140
Pennington Creek	245.3	1.230
Sandy Creek	57.0	0.340
Mineral Creek	64.7	0.373
Minor tributaries & immediate drainage -	3,196.6	18.080
Totals	37,140.3	147.693

2. Outlet -

Red River	37,500.5**	137.000**

C. Precipitation***:

1. Year of sampling: 117.0 centimeters.
2. Mean annual: 101.2 centimeters.

[†] Table of metric conversions--Appendix B.

[††] Moczygemba, 1974.

* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".

** Includes area of lake; average discharge - 52 years record (Anonymous, 1976).

*** See Working Paper No. 175.

III. WATER QUALITY SUMMARY

Lake Texoma was sampled four times in 1974 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from one or more depths at seven stations on the lake (see map, page vi). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first and last visits, two 18.9-liter depth-integrated samples were composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 28.0 meters at station 1, 24.4 meters at station 2, 21.3 meters at station 3, 4.6 meters at station 4, 16.8 meters at station 5, 6.1 meters at station 6, and 3.0 meters at station 7.

The sampling results are presented in full in Appendix D and are summarized in the following table (the August nutrient samples were not preserved properly and were not analyzed).

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR TEXOMA LAKE
STORET CODE [illegible]

PARAMETER	1ST SAMPLING (3/ 9/74) 7 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (5/ /74) 7 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (8/ /74) 7 SITES RANGE	MEAN	MEDIAN
TEMP (C)	10.4 - 16.4	13.7	12.9	20.3 - 25.0	22.0	23.1	24.7 - 27.6	26.3	26.6
DISS OXY (MG/L)	7.6 - 10.4	9.6	9.8	2.0 - [illegible]	6.0	6.8	0.5 - 7.2	4.3	6.0
CNDCTVY (MCROMO)	635. - 1951.	1031.	864.	994. - 2730.	1386.	1245.	1135. - 2600.	1736.	1605.
PH (STAND UNITS)	7.9 - 8.5	8.2	8.2	7.7 - 8.4	8.1	8.1	7.6 - 8.1	8.0	8.2
TOT ALK (MG/L)	124. - 268.	151.	138.	115. - 165.	146.	138.	---- - ----	----	----
TOT P (MG/L)	0.019 - 0.105	0.034	0.029	0.032 - 0.254	0.067	0.051	---- - ----	----	----
ORTHO P (MG/L)	0.006 - 0.060	0.014	0.012	0.014 - 0.087	0.034	0.035	---- - ----	----	----
NO2+NO3 (MG/L)	0.038 - 0.148	0.075	0.075	0.100 - 0.440	0.237	0.240	---- - ----	----	----
AMMONIA (MG/L)	0.020 - 0.116	0.034	0.030	0.040 - 0.170	0.092	0.080	---- - ----	----	----
KJEL N (MG/L)	0.400 - 0.700	0.514	0.500	0.300 - 1.000	0.512	0.460	---- - ----	----	----
INORG N (MG/L)	0.060 - 0.220	0.114	0.105	0.170 - 0.590	0.329	0.290	---- - ----	----	----
TOTAL N (MG/L)	0.430 - 0.758	0.592	0.590	0.580 - 1.440	0.784	0.610	---- - ----	----	----
CHLRPYL A (UG/L)	1.7 - 9.1	4.7	3.7	1.9 - 9.4	4.6	5.3	11.0 - 51.0	26.7	19.1
SECCHI (METERS)	0.5 - 2.4	1.4	1.5	0.2 - 1.6	1.0	1.2	0.3 - 2.7	1.6	1.7

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR TEXOMA LAKE
STORET CODE [illegible]

4TH SAMPLING (10/31/74)

PARAMETER	7 SITES RANGE	MEAN	MEDIAN
TEMP (C)	19.8 - 20.4	20.2	20.2
DISS OXY (MG/L)	2.4 - 8.2	7.6	7.4
CNDCTVY (MCROMO)	293. - 2173.	1255.	1357.
PH (STAND UNITS)	7.7 - 8.4	8.2	8.2
TOT ALK (MG/L)	96. - 127.	118.	122.
TOT P (MG/L)	0.030 - 0.390	0.071	0.040
ORTHO P (MG/L)	0.009 - 0.044	0.014	0.007
NO2+NO3 (MG/L)	0.020 - 0.131	0.046	0.040
AMMONIA (MG/L)	0.030 - 0.370	0.071	0.046
KJEL N (MG/L)	0.400 - 1.300	0.594	0.500
INORG N (MG/L)	0.050 - 0.400	0.151	0.150
TOTAL N (MG/L)	0.420 - 1.390	0.646	0.570
CHLRPYL A (UG/L)	5.4 - 29.2	17.7	15.4
SECCHI (METERS)	0.2 - 1.4	0.9	1.2

B. Biological characteristics:

1. Phytoplankton

Sampling Date	Dominant Genera	Algal Units per ml
03/09/74	1. Chroomonas sp.	2,270
	2. Flagellates	900
	3. Centric diatoms	643
	4. Ankistrodesmus sp.	514
	5. Cryptomonas sp.	257
	Other genera	214
	Total	4,798
05/17/74	1. Diploneis sp.	324
	2. Cryptomonas sp.	265
	3. Centric diatoms	236
	4. Scenedesmus sp.	177
	5. Coelastrum sp.	118
	Other genera	794
	Total	1,914
08/09/74	1. Oscillatoria sp.	3,886
	2. Raphidiopsis sp.	1,943
	3. Nitzschia sp.	1,229
	4. Lyngbya sp.	991
	5. Centric diatoms	397
	Other genera	1,349
	Total	9,795
10/31/74	1. Oscillatoria sp.	2,662
	2. Dactylococcopsis sp.	355
	3. Nitzschia sp.	310
	4. Cyclotella sp.	266
	5. Chlamydomonas sp.	222
	Other genera	710
	Total	4,525

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (µg/l)
03/09/74	1	1.1
	2	2.2
	3	3.7
	4	5.8
	5	2.3
	6	5.1
	7	9.1
06/17/74	1	1.8
	2	5.5
	3	6.0
	4	4.6
	5	5.0
	6	5.9
	7	5.3
08/09/74	1	11.8
	2	16.5
	3	11.8
	4	29.6
	5	18.1
	6	29.6
	7	53.8
10/31/74	1	9.4
	2	11.9
	3	12.7
	4	25.0
	5	18.1
	6	26.2
	7	-

C. Limiting Nutrient Study:

Due to significant nutrient losses in the samples during shipment from the field to the laboratory, the algal assay results are not representative of conditions in the lake at the times the samples were taken (03/09/74 and 10/31/74). The lake data indicate the lake was nitrogen limited at most sampling stations and times; i.e., the mean inorganic nitrogen/orthophosphorus ratios were 13/1 or less, and nitrogen limitation would be expected. However, at station 2, the mean N/P ratios were 16/1 and 14/1 in March and October, respectively, and phosphorus limitation would be expected there at those times.

Nitrogen limitation, as indicated by in-lake nitrogen to phosphorus ratios, does not necessarily mean that the trophic condition of the lake can be improved by controlling nitrogen inputs. In many cases, the apparent condition of nitrogen limitation results from excessive phosphorus input from point sources and is often accompanied by a corresponding increase in primary production. In such cases, the reversal of the enriched condition depends upon phosphorus control, not nitrogen control.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Texas National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page vi), except for the months of April and May when two samples were collected. Sampling was begun in September, 1974, and was completed in October, 1975.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Texas District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries (except Mineral Creek) were calculated using mean annual concentrations and mean annual flows. Nutrient loads shown are those measured minus point-source loads, if any.

The nutrient loads measured at the Whitesboro wastewater treatment plant exceeded the loads measured in Mineral Creek at station K-1, and the background loads for this stream and the unsampled "minor tributaries and immediate" ("ZZ" of U.S.G.S.) were estimated using the mean concentrations at stations F-1 and J-1 and the mean annual Mineral Creek and ZZ flows.

The operators of the Camp Rocky Point, Dennison Airport, Saddler, and Whitesboro, Texas, and Madill, Oklahoma wastewater treatment plants provided monthly effluent samples and corresponding flow data. The operators of the 12 other listed wastewater treatment plants did not participate; nutrient loads from these sources were estimated at 1.134 kg P and 3.401 kg N/capita/year, and flows were estimated at 0.3785 m³/capita/day.

A. Waste Sources:

1. Known municipal* -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Camp Rocky Point, TX	140	tr. filter	5.2	Lake Texoma
Dennison, TX, Airport plant	500	act. sludge	469.0	Unnamed tributary to Lake Texoma
Saddler, TX	365	oxid. ditch	138.0	Lake Texoma
Whitesboro, TX	3,000	act. sludge	823.8	Lake Texoma
Marietta, OK	2,000	tr. filter	757.0	Bills Creek
Ardmore, OK				
Eastside plant	7,500	tr. filter	2,838.8	Anadarko Creek
NE plant	3,500	tr. filter	1,324.8	Sand Creek
SW plant	1,750	tr. filter	662.4	Hickory Creek
W plant	6,200	tr. filter	2,346.7	Hickory Creek
Kingston, OK	500	stab. pond	189.3	Caney Creek
Tishomingo, OK	1,400	Imhoff tank	529.9	Pennington Creek
Dougherty, OK	235	stab. pond	88.9	Rock Creek
Davis, OK	1,700	tr. filter	643.5	Washita River
Wilson, OK	1,300	stab. pond	492.1	Walnut Creek
Healdton, OK	2,000	tr. filter	757.0	Whiskey Creek
Madill, OK	3,000	tr. filter	575.9	Glasses Creek
Oakland, OK	325	stab. pond	123.0	Glasses Creek

2. Industrial - Unknown

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* Anonymous, 1971; treatment plant questionnaires.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Red River	1,030,820	69.7
Hickory Creek	8,190	0.6
Washita River	373,965	25.3
Pennington Creek	735	0.1
Sandy Creek	485	<0.1
Mineral Creek	390	<0.1
b. Minor tributaries & immediate drainage (non-point load) -	18,815	1.3
c. Known municipal STP's -		
Camp Rocky Point, TX	5	<0.1
Dennison, TX, Airport plant	650	<0.1
Saddler, TX	150	<0.1
Whitesboro, TX	3,185	0.2
Marietta, OK	2,270	0.2
Ardmore, OK		
Eastside plant	8,505	0.6
NE plant	3,970	0.3
SW plant	1,985	0.1
W plant	7,030	0.5
Kingston, OK	565	<0.1
Tishomingo, OK	1,590	0.1
Dougherty, OK	265	<0.1
Davis, OK	1,930	0.1
Wilson, OK	1,475	0.1
Healdton, OK	2,270	0.2
Madill, OK	2,280	0.2
Oakland, OK	370	<0.1
d. Septic tanks* -	225	<0.1
e. Industrial - Unknown	?	-
f. Direct precipitation** -	6,305	0.4
Total	1,478,415	100.0

---

* Estimate based on two parks, three camps, and 766 lakeshore dwellings; see Working Paper No. 175.

** See Working Paper No. 175.

2. Outputs -

	kg P/ yr
Lake outlet - Red River	591,900

3. Net annual P accumulation = 886,515 kg.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr	% of total
a. Tributaries (non-point load) -		
Red River	6,200,445	56.4
Hickory Creek	84,950	0.8
Washita River	3,604,575	32.8
Pennington Creek	32,930	0.3
Sandy Creek	10,690	0.1
Mineral Creek	10,915	0.1
b. Minor tributaries & immediate drainage (non-point load) -	529,120	4.8
c. Known municipal STP's -		
Camp Rocky Point, TX	30	<0.1
Dennison, TX, Airport plant	2,470	<0.1
Saddler, TX	290	<0.1
Whitesboro, TX	7,135	0.1
Marietta, OK	6,800	0.1
Ardmore, OK		
Eastside	25,510	0.2
NE plant	11,905	0.1
SW plant	5,950	0.1
W plant	21,085	0.2
Kingston, OK	1,700	<0.1
Tishomingo, OK	4,760	<0.1
Dougherty, OK	800	<0.1
Davis, OK	5,780	0.1
Wilson, OK	4,420	<0.1
Healdton, OK	6,800	0.1
Madill, OK	5,705	0.1
Oakland, OK	1,105	<0.1

Source	kg N/ yr	% of total
d. Septic tanks* -	8,445	0.1
e. Industrial - Unknown	?	-
f. Direct precipitation** -	388,050	3.5
Total	10,983,115	100.0

2. Outputs -

Lake outlet - Red River 6,143,655

3. Net annual N accumulation - 4,839,460 kg.

D. Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Red River	16	96
Hickory Creek	26	267
Washita River	20	191
Pennington Creek	3	134
Sandy Creek	9	188

E. Mean Nutrient Concentrations in Ungaged Streams:

Tributary	Mean Total P Conc. (mg/l)	Mean Total N Conc. (mg/l)
Mill Creek	0.037	0.705
Brushy Creek	0.061	0.986
Oil Creek	0.040	1.714

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* Estimate based on two parks, three camps, and 766 lakeshore dwellings; see Working Paper No. 175.

* See Working Paper No. 175.

F. Yearly Loads:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m²/yr	4.10	2.46	30.5	13.4

Vollenweider phosphorus loadings (g/m²/yr) based on mean depth and mean hydraulic retention time of Lake Texoma:

"Dangerous" (eutrophic loading)	0.66
"Permissible" (oligotrophic loading)	0.34

V. LITERATURE REVIEWED

Anonymous, 1971. Inventory of municipal waste facilities: EPA Publ. OWP-1, vol. 6, Wash., DC.

Anonymous, 1976. Water resources data for Texas, water year 1975. Water-Data Rept. TX-75-1, U.S. Geol. Surv., Austin.

Moczygemba, John H., 1974. Population and vegetation control and stocking recommendations. Fed. Aid Proj. F-8-R-21, TX Parks & Wildlife Dept., Austin.

Vollenweider, R. A., and P. J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	4804	CANYON RESERVOIR	445
2	4823	LAKE MEREDITH	441
3	4813	EAGLE MOUNTAIN LAKE	430
4	4826	KEMP LAKE	423
5	4801	AMISTAD LAKE	402
6	4805	BROWNWOOD LAKE	394
7	4802	BASTROP LAKE	392
8	4839	WHITE RIVER RESERVOIR	388
9	4825	POSSUM KINGDOM RESERVOIR	387
10	4835	TRAVIS LAKE	384
11	4803	BELTON RESERVOIR	384
12	4831	STILLHOUSE HOLLOW RESERV	372
13	4812	DIVERSION LAKE	372
14	4808	CALAVERAS LAKE	362
15	4829	WHITNEY LAKE	357
16	4822	MEDINA LAKE	342
17	4827	SAM RAYBURN RESERVOIR	322
18	4830	E V SPENCE RESERVOIR	321
19	4837	TWIN BUTTES RESERVOIR	311
20	4810	LAKE COLORADO CITY	310
21	4824	PALESTINE LAKE	302
22	4819	LAKE OF THE PINES	298
23	4807	CADDO LAKE	297
24	4814	FT PHANTOM HILL LAKE	296
25	4806	LAKE BUCHANAN	261
26	4838	STAMFORD LAKE	259
27	4819	LAVON RESERVOIR	258
28	4832	TAWAKONI LAKE	253

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
29	4421	LYNDON B JOHNSON LAKE	232
30	4434	TEXOMA LAKE	217
31	4427	SOMERVILLE LAKE	209
32	4429	SAN ANGELO RESERVOIR	208
33	4433	TEXARKANA LAKE	176
34	4435	GARZA LITTLE ELM RESERVOIR	173
35	4436	TRINIDAD	164
36	4404	BRAUNIG LAKE	159
37	4411	CORPUS CHRISTI LAKE	155
38	4417	HOUSTON LAKE	136
39	4420	LIVINGSTON LAKE	41

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P
4801	AMISTAD LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4802	BASTROP LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4803	BELTON RESERVOIR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4804	BRAUNIG LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4805	BROWNWOOD LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4806	LAKE BUCHANAN	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4807	CADDO LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4808	CALAVERAS LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4809	CANYON RESERVOIR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4810	LAKE COLORADO CITY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4811	CORPUS CHRISTI LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4812	DIVERSION LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4813	EAGLE MOUNTAIN LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4814	FT PHANTOM HILL LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4815	GARZA LITTLE ELM RESERVO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4816	KEMP LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4817	HOUSTON LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4818	LAKE OF THE PINES	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4819	LAVON RESERVOIR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4820	LIVINGSTON LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4821	LYNDON B JOHNSON LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4822	MEDINA LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4823	LAKE MEREDITH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4824	PALESTINE LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4825	POSSUM KINGDOM RESERVOIR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4826	SAN ANGELO RESERVOIR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4827	SAM RAYBURN RESERVOIR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4829	E V SPENCE RESERVOIR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P
4829	SOMERVILLE LAKE	0.051	0.135	473.833	24.441	13.200	0.011
4830	STAMFORD LAKE	0.071	0.200	465.750	16.457	10.400	0.012
4831	STILLHOUSE HOLLOW RESERVOIR	0.014	0.140	406.250	3.767	15.000	0.008
4832	TAWAKONI LAKE	0.044	0.180	466.417	16.246	13.200	0.013
4833	TEXARKANA LAKE	0.136	0.120	476.500	19.119	12.400	0.038
4834	TEXOMA LAKE	0.042	0.190	451.125	12.443	15.000	0.019
4835	TRAVIS LAKE	0.016	0.250	395.913	3.595	15.000	0.007
4836	TRINIDAD	0.380	4.130	475.500	24.300	10.000	0.244
4837	TWIN BUTTES RESERVOIR	0.029	0.250	456.917	6.700	14.800	0.009
4838	WHITE RIVER RESERVOIR	0.083	0.130	434.500	4.333	15.000	0.009
4839	WHITNEY LAKE	0.025	0.120	438.500	6.912	15.000	0.006

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P	INDEX NO
4801	AMISTAD LAKE	95 (36)	5 (2)	100 (38)	100 (38)	39 (14)	63 (23)	402
4802	ARROWHEAD LAKE	79 (30)	74 (28)	82 (31)	47 (18)	17 (0)	92 (35)	393
4803	BELTON RESERVOIR	92 (35)	26 (10)	47 (17)	68 (26)	17 (0)	84 (32)	334
4804	BRAUNIG LAKE	5 (2)	42 (16)	58 (22)	8 (3)	41 (15)	5 (2)	159
4805	BROWNWOOD LAKE	66 (25)	70 (26)	29 (11)	87 (33)	58 (22)	84 (32)	394
4806	LAKE BUCHANAN	47 (18)	21 (8)	74 (28)	63 (24)	17 (0)	39 (15)	261
4807	CADDO LAKE	26 (10)	91 (33)	42 (16)	32 (12)	76 (28)	38 (14)	307
4808	CALAVERAS LAKE	45 (17)	100 (38)	47 (18)	11 (4)	67 (25)	92 (34)	362
4809	CANYON RESERVOIR	98 (37)	8 (3)	95 (36)	47 (17)	44 (17)	47 (17)	446
4810	LAKE COLORADO CITY	39 (14)	74 (28)	26 (10)	42 (16)	88 (32)	39 (14)	308
4811	CORPUS CHRISTI LAKE	8 (3)	47 (18)	18 (7)	13 (5)	61 (22)	8 (3)	155
4812	DIVERSION LAKE	68 (26)	82 (31)	32 (12)	29 (11)	97 (35)	63 (24)	371
4813	EAGLE MOUNTAIN LAKE	71 (27)	91 (33)	34 (13)	79 (30)	75 (27)	75 (28)	425
4814	FT PHANTOM HILL LAKE	24 (9)	66 (25)	21 (8)	74 (28)	95 (34)	16 (6)	296
4815	GARZA LITTLE ELM RESERVO	34 (13)	13 (5)	16 (6)	34 (13)	55 (20)	21 (7)	173
4816	KEMP LAKE	76 (29)	61 (23)	55 (21)	55 (21)	84 (32)	92 (34)	423
4817	HOUSTON LAKE	16 (6)	16 (6)	8 (3)	24 (9)	72 (26)	11 (4)	147
4818	LAKE OF THE PINES	54 (20)	76 (28)	66 (25)	39 (15)	17 (0)	47 (17)	299
4819	LAVON RESERVOIR	21 (8)	29 (11)	3 (1)	84 (32)	100 (36)	21 (7)	258
4820	LIVINGSTON LAKE	3 (1)	3 (1)	39 (15)	26 (10)	17 (0)	3 (1)	91
4821	LYNDON B JOHNSON LAKE	39 (14)	11 (4)	53 (20)	66 (25)	39 (14)	38 (14)	246
4822	MEDINA LAKE	98 (37)	0 (0)	89 (34)	37 (14)	17 (0)	100 (38)	342
4823	LAKE MEREDITH	82 (31)	91 (33)	71 (27)	95 (36)	39 (14)	63 (23)	441
4824	PALESTINE LAKE	54 (20)	32 (12)	63 (24)	53 (20)	44 (17)	51 (19)	297
4825	POSSUM KINGDOM RESERVOIR	74 (28)	91 (33)	84 (32)	58 (22)	17 (0)	63 (23)	387
4826	SAN ANGELO RESERVOIR	13 (5)	45 (17)	8 (3)	0 (0)	88 (32)	46 (17)	200
4827	SAM RAYBURN RESERVOIR	59 (22)	39 (15)	68 (26)	76 (29)	17 (0)	63 (23)	322
4829	E V SPENCE RESERVOIR	50 (19)	63 (23)	45 (17)	53 (20)	17 (0)	75 (28)	303

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P	INDEX NO
4829	SOMERVILLE LAKE	29 (11)	55 (21)	24 (9)	3 (1)	67 (25)	30 (10)	264
4830	STAMFORD LAKE	18 (7)	97 (37)	5 (2)	18 (7)	82 (31)	39 (14)	259
4831	STILLHOUSE HOLLOW RESERV	88 (33)	37 (14)	87 (33)	92 (35)	17 (6)	51 (19)	372
4832	TAWAKONI LAKE	32 (12)	78 (29)	37 (14)	21 (8)	63 (24)	38 (14)	269
4833	TEXARKANA LAKE	11 (4)	51 (19)	13 (5)	16 (6)	72 (27)	13 (5)	176
4834	TEXOMA LAKE	39 (14)	34 (13)	61 (23)	45 (17)	17 (6)	21 (7)	217
4835	TRAVIS LAKE	89 (33)	21 (7)	92 (35)	92 (34)	17 (6)	84 (31)	395
4836	TRINIDAD	0 (0)	61 (22)	11 (4)	5 (2)	92 (35)	8 (3)	166
4837	TWIN BUTTES RESERVOIR	59 (22)	21 (7)	58 (22)	61 (23)	46 (17)	63 (23)	311
4838	WHITE RIVER RESERVOIR	84 (32)	61 (22)	76 (29)	89 (34)	17 (6)	62 (23)	348
4839	WHITNEY LAKE	63 (24)	51 (19)	76 (30)	71 (27)	17 (6)	76 (28)	357

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107 x 10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR TEAMS [illegible]

LAKE CODE [illegible] [illegible]

TOTAL DRAINAGE AREA OF LAKE(SQ KM) [illegible]

	SUB-DRAINAGE						NORMALIZED FLOWS(CMS)							
TRIBUTARY	AREA(SQ KM)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = [illegible]
SUM OF SUB-DRAINAGE AREAS = [illegible]

TOTAL FLOW IN = [illegible]
TOTAL FLOW OUT = [illegible]

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
[illegible]	11	74	[illegible]	3	[illegible]				
	12	74	[illegible]	3	[illegible]	31	[illegible]		
	1	75	[illegible]						
	2	75	[illegible]	[illegible]	[illegible]				
	3	75	[illegible]	[illegible]	[illegible]				
	4	75	[illegible]	[illegible]	[illegible]				
	5	75	[illegible]	[illegible]	[illegible]	27	[illegible]		
	6	75	[illegible]	[illegible]	[illegible]				
	7	75	[illegible]	[illegible]	[illegible]				
	8	75	[illegible]						
	9	75	[illegible]	7	[illegible]				
	10	75	[illegible]						
[illegible]	11	74	[illegible]	3	[illegible]				
	12	74	[illegible]	7	[illegible]				
	1	75	[illegible]	[illegible]	[illegible]				
	2	75	[illegible]	[illegible]	[illegible]				
	3	75	[illegible]						
	4	75	[illegible]	[illegible]	[illegible]				
	5	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	6	75	[illegible]	[illegible]	[illegible]				
	7	75	[illegible]	[illegible]	[illegible]				
	8	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	9	75	[illegible]						
	10	75	[illegible]	[illegible]	[illegible]				

TRIBUTARY FLOW INFORMATION FOR TEXAS [illegible]

LAKE CODE [illegible] [illegible] RES.

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
[illegible]	11	74	[illegible]	[illegible]	[illegible]				
	12	74	[illegible]	[illegible]	[illegible]				
	1	75	[illegible]	[illegible]	[illegible]				
	2	75	[illegible]	[illegible]	[illegible]				
	3	75	[illegible]	[illegible]	[illegible]				
	4	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	5	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	6	75	[illegible]	[illegible]	[illegible]				
	7	75	[illegible]	[illegible]	[illegible]				
	8	75	[illegible]						
	9	75	[illegible]	[illegible]	[illegible]				
	10	75	[illegible]	[illegible]	[illegible]				
[illegible]	11	74	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	12	74	[illegible]	[illegible]	[illegible]				
	1	75	[illegible]	[illegible]	[illegible]				
	2	75	[illegible]	[illegible]	[illegible]				
	3	75	[illegible]	[illegible]	[illegible]				
	4	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	5	75	[illegible]	[illegible]	[illegible]				
	6	75	[illegible]	[illegible]	[illegible]				
	7	75	[illegible]	[illegible]	[illegible]				
	8	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	9	75	[illegible]	[illegible]	[illegible]				
	10	75	[illegible]	[illegible]	[illegible]				
[illegible]	11	74	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	12	74	[illegible]	[illegible]	[illegible]				
	1	75	[illegible]	[illegible]	[illegible]				
	2	75	[illegible]	[illegible]	[illegible]				
	3	75	[illegible]	[illegible]	[illegible]				
	4	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	5	75	[illegible]	[illegible]	[illegible]				
	6	75	[illegible]	[illegible]	[illegible]				
	7	75	[illegible]	[illegible]	[illegible]				
	8	75	[illegible]	[illegible]	[illegible]				
	9	75	[illegible]	[illegible]	[illegible]				
	10	75	[illegible]	[illegible]	[illegible]				
[illegible]	9	74	[illegible]	[illegible]	[illegible]				
	10	74	[illegible]	[illegible]	[illegible]				
	11	74	[illegible]	[illegible]	[illegible]				
	12	74	[illegible]	[illegible]	[illegible]				
	1	75	[illegible]	[illegible]	[illegible]				
	2	75	[illegible]	[illegible]	[illegible]				
	3	75	[illegible]	[illegible]	[illegible]				
	4	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	5	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	6	75	[illegible]	[illegible]	[illegible]				
	7	75	[illegible]	[illegible]	[illegible]				
	8	75	[illegible]	[illegible]	[illegible]				
	10	75	[illegible]	[illegible]	[illegible]				

TRIBUTARY FLOW INFORMATION FOR TEXAS [illegible]

LAKE CODE [illegible] [illegible] RES.

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
[illegible]	9	74	[illegible]	[illegible]	[illegible]				
	10	74	[illegible]	[illegible]	[illegible]				
	11	74	[illegible]	3	[illegible]				
	12	74	[illegible]	[illegible]	[illegible]				
	1	75	[illegible]	5	[illegible]				
	2	75	[illegible]	[illegible]	[illegible]				
	3	75	[illegible]	[illegible]	[illegible]				
	4	75	[illegible]	20	[illegible]	[illegible]	[illegible]		
	5	75	[illegible]	4	[illegible]	[illegible]	[illegible]		
	6	75	[illegible]	[illegible]	[illegible]				
	7	75	[illegible]	[illegible]	[illegible]				
	8	75	[illegible]						
[illegible]	11	74	[illegible]						
	12	74	[illegible]						
	1	75	[illegible]						
	2	75	[illegible]						
	3	75	[illegible]						
	4	75	[illegible]						
	5	75	[illegible]						
	6	75	[illegible]						
	7	75	[illegible]						
	8	75	[illegible]						
	9	75	[illegible]						
	10	75	[illegible]						

STORET RETRIEVAL DATE [illegible]

[illegible]

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3+NH4- N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/03	13 05		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
74/11/07	14 15		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
74/12/03	14 30		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/01/10	10 30		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/02/19	13 10		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/03/08	12 [illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/04/05	15 15		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/04/13	14 00		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/06/07	13 45		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/07/27	14 10		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/08/13	14 30		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/09/07			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/10/10	13 45		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 76/02/11

483401
33 49 25.0 096 34 23.0
TEXOMA LAKE
48181 TEXAS

11EPALES 2111202
4 0093 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
74/03/26	10 00	0000	10.6		96	944	8.30	124	0.040	0.400	0.120	0.014
	10 00	0005	10.6	10.6		944	8.30	129	0.050	0.500	0.110	0.013
	10 00	0020	10.7	10.4		948	8.30	127	0.040	0.500	0.120	0.012
	10 00	0035	10.5	10.2		945	8.30	126	0.050	0.500	0.130	0.013
	10 00	0048	10.4	10.2		945	7.95	126	0.050	0.500	0.130	0.013
74/05/17	11 35	0000	20.7		72	1163	8.05	130	0.073	0.500	0.120	0.018
	11 35	0005	20.7	7.4		1163	8.00	130	0.070	0.400	0.140	0.027
	11 35	0015	20.3	6.8		1153	8.05	130	0.080	0.400	0.140	0.022
	11 35	0030	19.7	6.6		1147	8.05	130	0.070	0.400	0.230	0.025
	11 35	0046	19.3	5.6		1133	8.00	137	0.070	0.300	0.280	0.027
74/08/09	13 40	0000	26.1	8.6	90	1632	7.75					
	13 40	0005	26.1	5.8		1624	7.77					
	13 40	0020	26.0	6.4		1628	7.74					
	13 40	0030	25.4	6.2		1624	7.55					
	13 40	0040	25.0	6.0		1630	7.50					
	13 40	0045	23.7	6.0		1547	7.50					
74/10/31	14 25	0000	20.4	8.2	48	1342	7.95	112	0.090	0.700	0.080	0.021
	14 25	0005	20.7	6.8		1339	8.00	113	0.080	0.500	0.070	0.017
	14 25	0015	20.2	6.8		1370	8.00	115	0.090	0.465	0.080	0.016
	14 25	0030	20.1	6.8		1370	8.00	111	0.090	0.400	0.080	0.019
	14 25	0045	20.2	6.6		1369	8.00	114	0.070	0.400	0.080	0.018
	14 25	0060	20.2	6.6		1372	8.00	112	0.090	0.400	0.090	0.018
	14 25	0075	20.1	6.4		1379	8.00	112	0.110	0.500	0.090	0.011
	14 25	0092	20.4	6.0		1364	8.00	112	0.100	0.500	0.080	0.010

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STORET RETRIEVAL DATE [illegible]
                                                              [illegible]
                                                              33 40 16.0 096 34 23.0
                                                              TEXOMA LAKE
                                                              48181   TEXAS

                                                              11EPALES            2111202
                                                              4                   0073 FEET  DEPTH

                                  00665      32217      00031
 DATE      TIME DEPTH  PHOS-TOT  CHLRPHYL  INCDT LT
 FROM       OF                       A      REMNING
  TO       DAY  FEET    MG/L P     UG/L     PERCENT

[illegible] 10 00 0000     0.020        1.1
           10 00 0005     0.024
           10 00 0010     0.021
           10 00 0025     0.021
           10 00 0040     0.025
[illegible] 11 35 0000     0.111        1.6
           11 35 0005     0.032
           11 35 0015     0.035                  1.0
           11 35 0050     0.035
           11 35 0090     0.040
[illegible] 13 40 0000                 11.6
           13 40 0002                           50.0
           13 40 0019                            1.0
[illegible] 14 25 0000     0.040        9.4
           14 25 0005     0.040
           14 25 0015     0.039
           14 25 0030     0.040
           14 25 0045     0.042
           14 25 0060     0.040
           14 25 0075     0.040
           14 25 0092     0.054
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STORET RETRIEVAL DATE 76/02/11
                                                          480402
                                                          33 53 40.0 096 35 40.0
                                                          TEXOMA LAKE
                                                          [illegible]   TEXAS

                                                          11EPALES          2111202
                                                          4                  0070 FEET  DEPTH

                         00010     00300     00077      00094      00400     00410     00610     00625     00630     00671
DATE      TIME DEPTH     WATER     DO        TRANSP     CNDUCTVY   PH        T ALK     NH3-N     TOT KJEL  NO2&NO3   PHOS-DIS
FROM      OF             TEMP                SECCHI     FIELD                CACO3     TOTAL     N         N-TOTAL   ORTHO
TO        DAY  FEET      CENT      MG/L      INCHES     MICROMHO   SU        MG/L      MG/L      MG/L      MG/L      MG/L P

74/03/04  10 35 0000      12.3                  96        862       8.20      128      0.030     0.500     0.090     0.006
          10 35 0010      12.1     10.4                   863       8.20      127      0.030     0.500     0.090     0.007
          10 35 0020      11.4     10.6                   854       8.20      126      0.030     0.500     0.100     0.004
          10 35 0040      11.4     10.3                   850       8.20      126      0.036     0.500     0.092     0.004
74/05/17  11 05 0000      22.4                  48       1191       8.30      142      0.070     1.100     0.110     0.015
          11 05 0005      22.4      7.8                  1191       8.35      142      0.076     0.400     0.100     0.016
          11 05 0015      22.4      8.4                  1192       8.40      142      0.070     0.400     0.100     0.015
          11 05 0040      22.2      7.4                  1194       8.40      141      0.070     0.400     0.107     0.015
          11 05 0055      20.2      6.4                  1620       8.20      144      0.066     1.400     0.250     0.022
          11 05 0070      19.3      5.4                  1625       8.05      144      0.066     0.400     0.240     0.026
74/08/09  10 50 0000      26.6      5.3                 108       1552       8.37
          10 50 0005      26.6      6.2                  1552       8.37
          10 50 0020      26.6      6.2                  1552       8.32
          10 50 0040      25.5      6.8                  1552       8.34
          10 50 0055      25.1      6.8                  1620       7.59
          10 50 0080      24.7      6.8                  1711       7.42
74/10/31  13 50 0000      20.4      8.2                  72       1335       8.20      114      0.060     0.600     0.140     0.025
          13 50 0005      20.4      8.2                  1304       8.20      112      0.060     0.500     0.040     0.009
          13 50 0015      20.2      8.8                  1304       8.20      112      0.050     0.500     0.040     0.013
          13 50 0030      20.3      7.8                  1307       8.20      121      0.060     0.500     0.040     0.025
          13 50 0045      20.3      7.9                  1354       8.15      112      0.070     0.500     0.040     0.008
          13 50 0070      20.2      6.8                  1403       8.00      110      0.140     0.400     0.050     0.018
          13 50 0080      20.0      2.4                  1706       7.70      104      0.370     0.496     0.100     0.016
```

STORET RETRIEVAL DATE 76/02/11

483642
33 53 40.0 096 35 40.0
TEXOMA LAKE
48181 TEXAS

11EPALES 2111202
4 0048 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
74/03/09	10 35	0000	0.025	2.2	
	10 35	0010	0.028		
	10 35	0020	0.028		
	10 35	0040	0.014		
74/05/17	11 05	0000	0.137	5.5	
	11 05	0005	0.033		
	11 05	0015	0.034		
	11 05	0040	0.033		
	11 05	0055	0.043		
	11 05	0070	0.050		
74/08/09	10 50	0000		16.5	
	10 50	0002			50.0
	10 50	0020			1.0
74/10/31	13 50	0000	0.042	11.9	
	13 50	0005	0.034		
	13 50	0015	0.034		
	13 50	0037	0.039		
	13 50	0045	0.042		
	13 50	0070	0.044		
	13 50	0080	0.042		

STORET RETRIEVAL DATE 76/02/11

482403
34 00 06.0 096 37 16.0
TEXOMA LAKE
48181 TEXAS

11EPALES 2111202
3 0073 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
74/03/09	11 05	0000	13.6		72	767	8.20	153	0.020	0.500	0.700	0.007
	11 05	0005	13.6	10.8		769	8.30	151	0.020	0.500	0.070	0.008
	11 05	0015	13.4	9.9		766	8.30	157	0.020	0.400	0.080	0.007
	11 05	0035	12.9	10.2		752	8.30	161	0.010	0.400	0.100	0.007
	11 05	0060	11.8	6.2		635	8.10	179	0.080	0.500	0.140	0.013
74/05/17	10 30	0000	23.6		44	1041	8.35	148	0.040	0.600	0.160	0.016
	10 30	0005	23.6	7.2		1041	8.30	149	0.050	0.600	0.120	0.024
	10 30	0015	23.6	7.0		1040	8.30	148	0.080	0.600	0.140	0.016
	10 30	0040	23.5	7.0		1040	8.30	148	0.070	0.500	0.140	0.015
	10 30	0070	19.8	2.0		930	7.80	154	0.300	0.400	0.320	0.033
74/08/09	10 15	0000	26.7	6.8	48	1393	8.35					
	10 15	0005	26.7	6.2		1355	8.37					
	10 15	0020	26.7	6.0		1344	8.33					
	10 15	0050	26.6	5.6		1351	8.21					
	10 15	0066	25.0	0.4		1361	7.57					
74/10/31	12 05	0000	20.3	7.4	44	462	8.20	124	0.030	0.500	0.130	0.017
	12 05	0005	20.3	7.4		479	8.20	124	0.040	0.400	0.120	0.014
	12 05	0015	20.3	7.4		491	8.20	123	0.040	0.400	0.120	0.017
	12 05	0030	20.3	7.4		464	8.20	122	0.030	0.400	0.120	0.009
	12 05	0046	20.4	7.4		465	8.20	120	0.030	0.400	0.120	0.010
	12 05	0058	20.4	7.0		462	8.20	116	0.030	0.500	0.120	0.008

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
74/03/09	11 05	0000	0.025	3.7	
	11 05	0005	0.036		
	11 05	0015	0.021		
	11 05	0035	0.021		
	11 05	0060	0.020		
74/05/17	10 30	0000	0.041	6.0	
	10 30	0005	0.030		
	10 30	0010			1.0
	10 30	0015	0.039		
	10 30	0040	0.037		
	10 30	0070	0.046		
74/08/09	10 15	0000		11.6	
74/10/31	12 05	0000	0.045	12.7	
	12 05	0005	0.036		
	12 05	0015	0.038		
	12 05	0030	0.035		
	12 05	0046	0.047		
	12 05	0058	0.045		

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STORET RETRIEVAL DATE 7[illegible]

                                                   48[illegible]
                                                   3[illegible]
                                                   TEXOMA LAKE
                                                   48[illegible]   TEXAS

                                                   11EPALES            2111202
                                                   3                   0[illegible] FEET  DEPTH

                        00010     00300     00077     00094     00400     00410     00610     00625     00630     00671
  DATE   TIME DEPTH     WATER     DO        TRANSP    CNDUCTVY  PH        T ALK     NH3-N     TOT KJEL  NO2&NO3   PHOS-DIS
  FROM    OF            TEMP                SECCHI    FIELD               CACO3     TOTAL     N         N-TOTAL   ORTHO
   TO    DAY  FEET      CENT      MG/L      INCHES    MICROMHO  SU        MG/L      MG/L      MG/L      MG/L      MG/L P

[illegible] 11 40 0000  26.9                19        441       8.20      250       0.020     0.400     0.040     0.013
         11 40 0005     26.9      7.6                 439       8.10      256       0.030     0.700     0.050     0.019
         11 40 0010     26.0      7.0                 819       8.10      258       1.830     0.660     1.050     0.013
[illegible] 09 55 0000  25.2                12        780       7.70      165       0.080     1.000     0.440     0.041
         09 55 0005     25.2      7.2                 780       8.00      165       0.070     0.400     0.430     0.030
         09 55 0010     25.1      7.0                 690       8.00      165       0.070     0.400     0.420     0.042
[illegible] 09 50 0000  27.2      6.2       24        1120      8.31
         09 50 0005     27.0      6.0                 1135      8.32
         09 50 0010     27.0      6.2                 1130      8.36
[illegible] 11 35 0000  23.4      5.2       6         404       8.15      119       0.080     0.700     1.080     0.040
         11 35 0005     20.4      5.0                 403       8.20      127       0.060     0.700     1.090     0.044
         11 35 0015     19.6      2.6                 243       8.20      182       1.090     1.300     1.240     0.02[illegible]

                        00665     32217     00031
  DATE   TIME DEPTH     PHOS-TOT  CHLRPHYL  INCDT LT
  FROM    OF                      A         REMNING
   TO    DAY  FEET      MG/L P    UG/L      PERCENT

[illegible] 11 40 0000  0.071     5.6
         11 40 0005     0.064
         11 40 0010     0.067
[illegible] 09 55 0000  0.076     4.0
         09 55 0005     0.075
         09 55 0010     0.076
[illegible] 09 50 0000            24.6
[illegible] 11 35 0000  0.227     25.4
         11 35 0005     0.208
         11 35 0015     0.296
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STORET RETRIEVAL DATE 76/02/11
                                                    480475
                                                    33 40 29.0 096 45 16.0
                                                    TEXOMA LAKE
                                                    48181   TEXAS

                                                    11EPALES          2111202
                                                    0                 0000 FEET  DEPTH

                       00010     00300    00077    00094      00400     00410    00610     00625     00630     00671
  DATE    TIME DEPTH   WATER     DO       TRANSP   CNDUCTVY   PH        T ALK    NH3+NH4-  TOT KJEL  NO2&NO3   PHOS-DIS
  FROM    OF           TEMP               SECCHI   FIELD                CACO3    N TOTAL   N         N-TOTAL   ORTHO
   TO     DAY  FEET    CENT      MG/L     INCHES   MICROMHO   SU        MG/L     MG/L      MG/L      MG/L      MG/L P

74/03/09 14 45 0000    12.4                  40      2175      8.10      118     0.040     0.520     0.060     0.019
         14 45 0005    12.6       9.6                1650      8.25      125     0.040     0.500     0.070     0.020
         14 45 0015    12.7      10.8                 912      8.25      125     0.040     0.400     0.080     0.017
         14 45 0030    12.6       9.6                1150      8.20      130     0.050     0.500     0.050     0.025
         14 45 0055    12.1       8.4                1136      8.10      143     0.110     0.500     0.050     0.040
74/05/17 13 25 0000    24.1                  40      1600      8.10      138     0.120     0.700     0.150     0.041
         13 25 0005    23.4       7.4                1566      8.16      142     0.120     0.400     0.130     0.037
         13 25 0015    22.2       6.8                1512      8.10      135     0.120     0.400     0.120     0.035
         13 25 0022    21.4       6.2                1420      8.05      135     0.120     0.400     0.120     0.034
         13 25 0045    20.3       5.6                1409      8.00      136     0.120     0.400     0.110     0.033
         13 25 0055    19.4       4.2                1547      7.90      138     0.130     0.400     0.270     0.040
74/08/09 14 10 0000    27.1       5.4        40      1906      8.10
         14 10 0005    26.0       5.2                1901      8.13
         14 10 0017    26.6       2.2                2000      7.74
         14 10 0035    26.3       0.0                2100      7.40
         14 10 0052    25.4       0.0                2144      7.44
74/10/31 18 55 0000    20.1       8.2        40      1486      8.40       40     0.030     0.700     0.030     0.019
         18 55 0005    20.2       8.2                1490      8.40       40     0.040     0.600     0.030     0.020
         18 55 0015    20.2       8.0                1480      8.40       40     0.040     0.500     0.030     0.021
         18 55 0025    20.1       7.6                1529      8.40       40     0.040     0.500     0.030     0.021
         18 55 0045    20.1       7.2                1630      8.30      160     0.040     0.600     0.040     0.021
         18 55 0051    20.1       6.6                1604      8.25      181     0.110     0.600     0.150     0.017
                       00665     32217    00078
  DATE    TIME DEPTH   PHOS-TOT  CHLRPHYL INCDT LT
  FROM    OF                     A        REMNING
   TO     DAY  FEET    MG/L P    UG/L     PERCENT

74/03/09 14 45 0000    0.036       2.3
         14 45 0005    0.039
         14 45 0015    0.025
         14 45 0030    0.036
         14 45 0055    0.051
74/05/17 13 25 0000    0.073       5.0
         13 25 0005    0.041
         13 25 0015    0.052
         13 25 0022    0.055
         13 25 0045    0.051
         13 25 0055    0.072
74/08/09 14 10 0000               14.1
         14 10 0001                         50.0
         14 10 0017                          1.0
74/10/31 18 55 0000    0.054      16.1
         18 55 0005    0.055
         18 55 0015    0.053
         18 55 0025    0.053
         18 55 0045    0.041
         18 55 0051    0.047
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STORET RETRIEVAL DATE 79/02/11

                                                  481405
                                                  33 48 07.0 096 48 23.0
                                                  TEXOMA LAKE
                                                  48181   TEXAS

                                                  11EPALES             2111202
                                                  4                    0025 FEET  DEPTH

                       00010     00300     00077     00094     00400     00410     00610     00625     00630     00671
DATE   TIME DEPTH     WATER      DO       TRANSP    CNDUCTVY    PH       T ALK     NH3-N    TOT KJEL   NO2&NO3   PHOS-DIS
FROM    OF            TEMP                SECCHI    FIELD                CACO3     TOTAL       N       N-TOTAL    ORTHO
 TO    DAY  FEET      CENT      MG/L      INCHES    MICROMHO    SU       MG/L      MG/L      MG/L      MG/L      MG/L P

74/03/09 14 55 0000    15.3                 30        1196      8.20      124      0.030     0.500     0.410     0.024
         14 55 0005    15.2      9.6                  1196      8.30      124      0.030     0.500     0.370     0.025
         14 55 0015    14.3      9.6                  1180      8.30      126      0.030     0.400     0.410     0.017
         14 55 0020    13.3      9.6                  1180      8.25      132      0.040     0.500     0.420     0.021
74/05/17 13 55 0000    24.6                 36        1637      8.30      129      0.130     0.700     0.120     0.032
         13 55 0005    24.1      7.2                  1637      8.30      129      0.130     0.500     0.110     0.031
         13 55 0015    23.4      7.2                  1642      8.20      131      0.120     0.500     0.120     0.034
         13 55 0020    23.3      6.4                  1644      8.00      129      0.120     0.700     0.110     0.032
74/08/09 14 40 0000    26.4      7.8        48        2023      8.25
         14 40 0005    26.4      5.8                  2022      8.10
         14 40 0015    26.3      6.6                  2020      8.10
74/10/31 10 00 0000    20.1      7.2        24        1151      8.20       46      0.040     0.700     0.040     0.022
         10 00 0005    20.2      7.4                  1244      8.20       46      0.030     0.400     0.020K    0.019
         10 00 0015    20.2      7.6                  1248      8.20       45      0.030     0.400     0.020K    0.018
         10 00 0020    20.2      7.6                  1248      8.20       45      0.030     0.400     0.020K    0.014

                       00665     32217     00031
DATE   TIME DEPTH    PHOS-TOT   CHLRPHYL   INCDT LT
FROM    OF                         A       REMNING
 TO    DAY  FEET      MG/L P      UG/L     PERCENT

74/03/09 14 55 0000    0.032       5.1
         14 55 0005    0.031
         14 55 0015    0.033
         14 55 0020    0.037
74/05/17 13 55 0000    0.067       5.0
         13 55 0005    0.066
         13 55 0050                          1.0
         13 55 0015    0.067
         13 55 0020    0.043
74/08/09 14 40 0000               26.6
74/10/31 10 00 0000    0.057      26.2
         10 00 0005    0.074
         10 00 0015    0.055
         10 00 0020    0.056

  K VALUE KNOWN TO BE
  LESS THAN INDICATED
```

STORET RETRIEVAL DATE 74/02/11

483407
33 57 26.0 096 55 24.0
TEXOMA LAKE
48181 TEXAS

11EPALES 2111202
0 [illegible] FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/09	15 30	0000	17.7		24	1958	8.50	170	0.030	0.600	0.030	0.007
	15 30	0002	17.7	6.0		1956						
	15 30	0008	17.7	6.8		1951	8.50	170	0.030	0.700	0.040	0.002
73/05/17	14 20	0000	25.6		6	2730	8.25	115	0.170	0.900	0.420	0.006
	14 20	0005	25.4	6.0		2734	8.20	115	0.110	0.700	0.410	0.006
	14 20	0010	25.0	7.8		2727	8.20	115	0.180	0.600	0.400	0.007
73/08/09	15 05	0000	26.0	7.8	12	2664	8.40					
	15 05	0004	26.4	7.2		2613	8.47					
	15 05	0008	26.7	7.0		2675	8.45					
73/10/31	10 30	0000	20.3	7.6	12	2173	8.30	110	0.040	0.600	0.020K	0.005

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
73/03/09	15 30	0000	0.103	9.1	
	15 30	0008	0.105		
73/05/17	14 20	0000	0.140	5.3	
	14 20	0005	0.150		
	14 20	0010	0.25		
73/08/09	15 05	0000		53.0	
	15 05	0002			1.0
73/10/31	10 30	0000	0.090		

K VALUE KNOWN TO BE
LESS THAN INDICATED

APPENDIX E

TRIBUTARY AND WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 76/03/18

[illegible]
[illegible]
[illegible]
[illegible]
[illegible] LAKE
[illegible] DENISON
[illegible]
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-NH4- N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
[illegible]	09 45		0.120	0.700	0.070	0.020	0.040
[illegible]	10 07		0.111	1.200	0.046	0.015	0.030
[illegible]	12 16		0.120	2.400	1.3[illegible]	0.020	0.030
[illegible]	11 00		0.525	1.400	0.115	0.195	0.330
[illegible]	09 35		0.110	0.950	0.025	[illegible]	0.040
[illegible]	[illegible]		0.110	1.500	0.075	[illegible]	0.080
[illegible]	[illegible]		0.230	1.050	0.035	[illegible]	0.520
[illegible]	09 35		0.190	1.400	0.070	[illegible]	0.050
[illegible]	[illegible]		0.175	0.400	0.067	0.020	0.080
[illegible]	11 45		0.095	0.300	0.075	0.040	0.070
[illegible]	09 00		0.010	1.750	0.440	0.135	0.210
[illegible]	[illegible]		0.025	1.200	0.200	0.140	0.200

STORET RETRIEVAL DATE 76/03/10

[illegible]
[illegible]
[illegible]
[illegible] 7.5 [illegible]
[illegible]
[illegible] 7.5 [illegible]
[illegible]
[illegible]

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3+NH4- N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/03	16 50		1.300	2.750	0.050	0.150	1.950
74/12/07	14 45		0.404	5.400	5.000	0.200	0.420
75/01/19	09 30		0.504	1.400	0.176	0.240	0.280
75/02/09	10 00		0.624	1.900	0.136	0.160	0.290
75/04/12	07 30		0.005	1.000	0.035	0.070	0.325
75/04/13	13 35		0.140	0.500	0.340	0.130	0.420
75/05/07	13 25		0.255	1.400	0.200	0.025	0.040
75/05/29	14 20		0.120	2.400	0.230	0.117	1.040
75/06/08	08 50		0.470	4.700	0.100	0.145	0.616
75/07/10	09 20		0.005	1.550	0.036	0.195	0.440
75/08/09	14 51		0.010	0.450	0.025	0.010	0.050
75/09/17	08 10		1.300	0.700	0.080	0.140	0.260
75/10/19	06 45		0.005	1.600	0.375	0.135	0.226

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STORET RETRIEVAL DATE 76/03/18
                                                                              403xx1
                                                                              3x 00 1x.0 0xx 0C 18.0 x
                                                                              [illegible]  CREEK
                                                                              40       7.5 L [illegible]
                                                                              [illegible] LAKE
                                                                              [illegible] 2.7 MI E JCT  x HWY 775
                                                                              11EPALES              2111202x
                                                                               0000 FEET  DEPTH  CLASS 00

                            00630      00625      00610      00671      00665
  DATE    TIME DEPTH  NO2&NO3   TOT KJEL   NH3+NH4-  PHOS-DIS   PHOS-TOT
  FROM     OF         N-TOTAL       N       TOTAL     ORTHO
   TO     DAY  FEET     MG/L       MG/L      MG/L     MG/L P     MG/L P

74/11/06 13 20          0.120      2.900     0.120     0.070     0.410
74/12/07 14 17          0.336      3.600     0.072     0.112     0.200
75/01/13 09 30          0.504      4.000     0.280     0.280     0.320
75/02/15 09 00          0.292      3.000     0.004     0.125     0.250
75/03/09 09 30          0.136      1.400     0.032     1.000     0.130
75/04/05 14 35          0.055      1.100     0.025     0.050     0.085
75/04/22 10 40          0.015      0.600     0.030     0.130     0.160
75/05/06 09 40          0.256      0.050     0.000     0.200     0.250
75/05/29 15 15          0.115      1.300     0.760     0.035     0.400
75/06/07 15 30          0.010      0.250     0.020     0.040     0.070
75/07/10 10 40          0.005      0.050     1.010     0.005     0.170
75/08/17 14 55          1.570      0.400     0.255     0.005     0.605
75/09/06 13 35          0.095      1.300     0.160     0.130     0.170
75/10/14 14 30          0.530      1.700     0.460     0.075     1.440
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STORET RETRIEVAL DATE 76/03/10
                                                                        405421
                                                                        34 15 34.0 096 40 36.0 4
                                                                        MILL CREEK
                                                                        40     [illegible]
                                                                        [illegible] LAKE
                                                                        [illegible]
                                                                        [illegible]                211124
                                                                        0000 FEET  DEPTH  CLASS 00

                                00630       00625       00610       00671       00665
  DATE    TIME DEPTH NO2&NO3    TOT KJEL    NH3+NH4-    PHOS-DIS    PHOS-TOT
  FROM     OF        N-TOTAL       N        TOTAL       ORTHO
   TO     DAY  FEET   MG/L        MG/L        MG/L       MG/L P      MG/L P

74/11/03 12 00        0.084       0.600       0.035       0.060       0.120
74/11/17 13 40        0.072       0.700       0.023       0.136       0.050
74/12/07 15 00        0.010       0.400       0.032       0.005       0.010
75/01/18 11 15        0.008       1.100       0.016       0.008K      0.010
75/02/18 13 45        0.005       0.700       0.016       0.006       0.010
75/03/04 11 15        0.005       0.500       0.005K      0.008K      0.020
75/04/05 16 01        0.010       0.056       0.250       0.005K      0.010K
75/04/13 14 30        0.012       1.350       0.045       0.005       0.020
75/07/27 14 55        0.050       0.400       0.066       0.020       0.070
75/08/03 14 00        0.015       0.350       0.030       0.065       0.040
75/09/07              0.010       0.300       0.016       0.005K      0.035
75/10/12 13 25        0.025       0.300       0.005       0.005K      0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED
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STORET RETRIEVAL DATE 76/03/10
                                                              [illegible]
                                                              36 21 57.0 094 51 57.0 4
                                                              [illegible] CREEK
                                                              40      7.5 [illegible]
                                                              T/[illegible] LAKE
                                                              [illegible] 2 MI N OF JCT W HWY 60
                                                              11EPALES            2111204
                                                               0000 FEET  DEPTH  CLASS 00

                         00630     00625     00610     00671     00665
  DATE   TIME DEPTH  NO2&NO3  TOT KJEL   NH3-N    PHOS-DIS  PHOS-TOT
  FROM    OF         N-TOTAL     N       TOTAL     ORTHO
   TO    DAY  FEET     MG/L     MG/L      MG/L     MG/L P    MG/L P

74/11/02 15 50         0.352     1.300     0.240     0.035     0.065
74/11/17 14 00         0.284     0.400     0.030     0.032     1.030
74/12/07               0.272     0.700     0.033     0.005     0.310K
75/01/18 11 45         0.280     0.300     0.016     0.005K    0.010K
75/02/26 10 00         0.430     0.500     0.016     0.005K    0.010K
75/03/08 11 00         1.120     0.400     0.008K    0.005K    0.010K
75/04/05 16 30         0.010     0.700     0.059     0.005K    0.010K
75/04/13 15 00         0.015     0.4[illegible]     0.145     0.005K    0.010K
75/06/07 14 37         0.155     1.400     0.270     0.005K    0.015
75/07/27 13 30         0.270     0.575     0.040     0.005     0.040
75/08/13 15 00         0.100     0.170     0.020     0.005     0.020
75/09/07               0.208     0.150     0.005     0.005K    0.030
75/10/18 14 50         0.020     0.200K    0.005K    0.005K    0.030

 K VALUE KNOWN TO BE
 LESS THAN INDICATED
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STORET RETRIEVAL DATE 76/03/10

[illegible]

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-NH4- N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/02	15 00		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
74/11/17	14 45		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
74/12/07	15 30		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/01/19	13 30		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/02/18	14 50		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/03/08	13 00		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/04/05	17 00		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/04/13	15 30		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/06/07	15 15		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/08/03	14 00		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/09/07			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

K VALUE KNOWN TO BE
LESS THAN INDICATED

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STORET RETRIEVAL DATE 76/03/10
                                                        [illegible]
                                                        33 44 40.0 098 51 54.0 4
                                                        BRUSHY CREEK
                                                        48      15 SOMERVILLE
                                                        TUTTLECRK LAKE
                                                        [illegible] 40 0296 1.4E 5 OF JCT W HWY 38
                                                        11EPALES              2111204
                                                         0000 FEET  DEPTH  CLASS 00

                          00630      00625      00610      00671      00665
  DATE   TIME DEPTH NO2&NO3  TOT KJEL    NH3-N    PHOS-DIS   PHOS-TOT
  FROM    OF        N-TOTAL     N        TOTAL     ORTHO
   TO    DAY  FEET   MG/L      MG/L      MG/L     MG/L P     MG/L P

74/11/03 10 20       0.026     0.440     0.040     0.012      0.025
74/12/12 11 00       0.032     0.700     0.020     0.005      0.010K
75/01/05 10 30       0.080     0.400     0.040     0.015      0.390
75/02/02 11 15       0.130     0.700     0.040     0.024      0.230
75/03/02 14 05       0.025     0.440     0.020     0.010      0.020
75/04/06 13 15       0.020     0.590     0.035     0.005K     0.010K
75/04/20 17 00       0.005     2.470     0.030     0.005      0.020
75/05/04 14 10       0.035     0.300     0.095     0.010      0.130
75/05/18 14 20       0.030     0.450     0.070     0.010      0.030
75/06/01 17 55       0.100     0.750     0.050     0.010      0.050
75/07/04 13 00       0.230     0.800     0.065     0.025      0.130
75/09/03             0.030     2.200     0.240     0.025      0.380

  K VALUE KNOWN TO BE
  LESS THAN INDICATED
```

49

STORET RETRIEVAL DATE 76/03/10

403441
34 19 55.0 086 55 50.0 4
[illegible] LAKE
48 7.5 [illegible]
[illegible] LAKE
[illegible] 40 0206 1.0 MI SE JCT W HWY 177
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-NH4- N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/25	11 00		0.352	1.300	0.035	0.005	0.010K
74/12/18	08 45		0.480	2.700	0.036	0.005	0.010K
75/01/27	09 15		0.480	1.000	0.220	0.008K	0.010K
75/02/11	11 30		0.336	0.900	0.084	0.008	0.010K
75/03/13	09 00		0.370	1.400	0.015	0.015	0.040
75/04/09	11 13		0.175	2.400	0.022	0.015	0.040
75/05/13	15 00		0.220	1.400	0.055	0.075	0.130
75/06/11	09 45		0.146	1.250	0.022	0.040	0.050
75/07/18	13 30		0.075	1.250	0.027	0.005K	0.030
75/08/13	17 00		0.030	0.200	0.030	0.005	0.020
75/09/08	11 00		0.010	1.250	0.005K	0.005K	0.040
75/10/20	11 25		0.015	1.500	0.030	0.005K	0.030

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

[illegible]
[illegible]
[illegible]
48 GRAYSON CO [illegible]
TEXOMA LAKE
[illegible]
[illegible] 2111202
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/09/09	16 00		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
74/10/06	12 10		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
74/11/03	11 00		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
74/12/01	11 25		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/01/05	10 50		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/02/02	11 25		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/03/02	16 15		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/04/06	13 30		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/04/20	17 15		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/05/04	14 10		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/05/14	16 15		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/06/01	14 30		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/07/06	13 30		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/08/02	13 30		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75/10/10	15 30		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE [illegible]

[illegible]

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-NH4- N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

L ACTUAL VALUE IS KNOWN TO BE
GREATER THAN VALUE GIVEN

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STORET RETRIEVAL DATE 76/03/10

                                                   [illegible]           [illegible]      [illegible]
                                                   30 35 28.0 094 45 09.0 4
                                                   [illegible]
                                                   [illegible]  7.5 [illegible]
                                                   [illegible] LAKE
                                                   [illegible]
                                                   [illegible]               [illegible]
                                                    0000 FEET  DEPTH  CLASS 00

                      00630     00625     00610     00671     00665     50051     50053
  DATE   TIME DEPTH NO2&NO3   TOT KJEL   NH3+NH4-  PHOS-DIS  PHOS-TOT   FLOW     CONDUIT
  FROM    OF        N-TOTAL      N       TOTAL     ORTHO               RATE     FLOW-MGD
   TO    DAY  FEET   MG/L      MG/L      MG/L     MG/L P    MG/L P    INST MGD  MONTHLY

75/06/13 14 00        3.400     9.100     0.240     5.400     6.700     0.283     0.270
75/06/25 15 00       20.000     4.400     0.039     4.600     4.600     0.266     0.256
75/07/21 13 30       19.000     4.400     0.075    11.000    11.500     0.141     0.165
75/08/22 09 00       16.000     5.400     0.125    11.000    11.400     0.132     0.156
75/09/02 13 00       22.000     0.500     0.150    12.300    13.500     0.125     0.144
75/09/26 09 00       20.000     6.700     0.025    11.000    17.000     0.119     0.147
75/10/13 14 00       24.000    26.000     0.100              12.400     0.126     0.140
75/10/30 13 30       24.000     4.600     0.100    13.400    13.000     0.115     0.125
76/01/13 09 00        3.400    31.000                                 145.000   124.000
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STORET RETRIEVAL DATE [illegible]

[illegible]

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3+NH4- N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
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STORET RETRIEVAL DATE 76/03/19

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DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
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STORET RETRIEVAL DATE [illegible]

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DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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STORET RETRIEVAL DATE [illegible]

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DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3+NH4- N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/[illegible]	10 00		1.500	4.400	2.000		1.500	0.125	0.240
74/[illegible]	11 00		0.400	18.000	4.450	3.700	4.300	0.241	0.125
75/[illegible]	13 00		0.600	19.000	6.600	3.100	4.400	0.200	0.232
75/[illegible]	11 00		4.200	12.000	1.520	2.500	3.300	0.136	0.207
75/[illegible]	14 00		0.740	5.000	0.200	0.500	1.600	0.257	0.125
75/[illegible]	10 00		0.050	23.400	10.600	2.200	4.450	0.112	0.127
75/[illegible]	10 00		0.100	18.500	0.770	1.100	2.000	0.200	0.107
75/[illegible]	12 00		0.025	22.000	11.500	1.000	6.400	0.079	0.136
75/[illegible]	09 30		1.250	26.000	5.100		5.250	0.000	0.033
75/[illegible]	10 00		1.350	19.500	1.430	.700	5.000	0.202	0.144
75/[illegible]	10 00		1.025	22.000	1.700	7.350	7.300	0.240	0.222

STORET RETRIEVAL DATE [illegible]

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DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
[illegible]	[illegible]								
CP(T)-			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]								
[illegible]	[illegible]								
CP(T)-			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]								
[illegible]	[illegible]								
CP(T)-			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]								
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[illegible]	[illegible]								
CP(T)-			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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CP(T)-			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]								
CP(T)-			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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CP(T)-			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]								
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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